Notice to Reader.—When you finish reading this magazine, place a 1 cent stamp on this notice, mail the magazine, and it will be placed in the hands of our soldiers or sailors destined to proceed overseas. No wrapping—No Address. *A. S. Burleson, Postmaster-General.*

SCIENCE

NEW SERIES
VOL. XLVII No. 1225

FRIDAY, JUNE 21, 1918

SINGLE COPIES, 15 CTS.
ANNUAL SUBSCRIPTION, $5.00

You can write on Gramercy Reagent Bottles

The only American-made Reagent Bottle with an ACID-PROOF INDESTRUCTIBLE BURNED-IN ENAMEL LABEL

If you want a record of some information about your reagents, use Gramercy Reagent Bottles and write your notes with lead pencil or ink on the labels. These memoranda may be readily erased. No need to use paper labels and soak them off when they have become unsightly or have served their purpose.

Gramercy Reagent Bottle labels have large, clear, **black letters** displayed on a flat, **white background.** The enamel label, burned in by a patented process, is **acid-proof,** does not chip, and is immune to damage from contact with hard substances.

Gramercy Reagent Bottles are strong and durable. At the same time they have a neat, dignified appearance, and, unlike the fancy bottles in barber shops and drug stores they help to create a scientific atmosphere in the laboratory

ORDER FROM YOUR APPARATUS DEALER

Already 112 different labels have been prepared Complete sets of 40 bottles, sizes and names similar to our No. 970 on page 64 of catalog "C," can be shipped immediately.

Capacity, oz.	*4*	*8*	*16*	*32*
No. 918, narrow mouth, each -	$0.50	$0.60	$0.80	$0.95
No. 922, narrow mouth, each -	.55	.65	.85	1.00
No. 936, wide mouth, each -	.55	.65	.85	1.00

Booklet fully descriptive, containing lists of available labels, gladly furnished on request. Write us for a copy

MANUFACTURED BY

EIMER AND AMEND

(FOUNDED 1851)

NEW YORK

Marine Biological Laboratory

Woods Hole, Mass.

INVESTIGATION
Entire Year

Facilities for research in Zoology, Embryology, Physiology and Botany. Seventy-six private laboratories, $100 each for not over three months. Thirty tables are available for beginners in research who desire to work under the direction of members of the staff. The fee for such a table is $50.00.

INSTRUCTION
July 3 to August 13, 1918

Courses of laboratory instruction with lectures are offered in Invertebrate Zoology, Embryology, Physiology and Morphology and Taxonomy of the Algae. Each course requires the full time of the student. Fee, $50. A lecture course on the Philosophical Aspects of Biology and Allied Sciences is also offered.

SUPPLY DEPARTMENT
Open the Entire Year

Animals and plants, preserved, living, and in embryonic stages. Preserved material of all types of animals and of Algae, Fungi, Liverworts and Mosses furnished for classwork, or for the museum. Living material furnished in season as ordered. Price lists of Zoological and Botanical material sent on application. State which is desired. For price lists and all information regarding material, address

GEO. M. GRAY, Curator, Woods Hole, Mass.

The annual announcement will be sent on application to The Director, Marine Biological Laboratory, Woods Hole, Mass.

TEACHERS WANTED

We have a steady demand for men in all departments of Science for Agricultural Colleges, and Universities. Special terms. Address

THE INTERSTATE TEACHERS' AGENCY
Macheca Building New Orleans, La.

The Microscope

12th Edition, Published April 10, 1917
Re-Written and largely Re-Illustrated
By SIMON HENRY GAGE of Cornell University
Postpaid $3.00

COMSTOCK PUBLISHING CO., Ithaca, N. Y.

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE

Entered in the post-office at Lancaster, Pa., as second class matter

Published every Friday

THE SCIENCE PRESS

LANCASTER, PA. GARRISON, N. Y.

SUB-STATION 84: NEW YORK

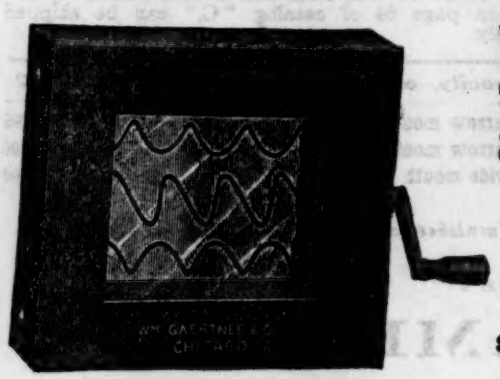
The L. & N. High Sensitivity Galvanometer

An instrument of extremely high sensitivity, yet one with which it is a pleasure to work because it is very easily set up and its working characteristics are all that could be desired.

If you have any research work involving the use of a galvanometer of high sensitivity this instrument can be built to your order, giving you the maximum sensitivity under your working conditions.

We solicit correspondence from those who are looking for an out-of-the-ordinary galvanometer

THE LEEDS & NORTHRUP CO.
4921 Stenton Avenue PHILADELPHIA

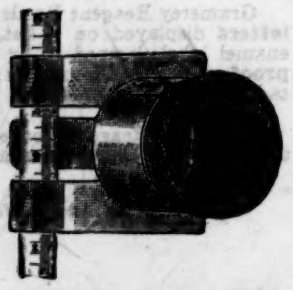


Prof. F. A. Saunder's Wave Projection Slide

Wm. Gaertner & Co.

Standard Apparatus of New and Improved Designs

Precision Measuring Instruments of great variety



Reading Device for Thermometers. Catalogue No. C1365, 1.80

5345-5349 Lake Park Ave. Chicago

SCIENCE

FRIDAY, JUNE 21, 1918

CONTENTS

The Organization of the Medical Profession for War: DR. ARTHUR DEAN BEVAN 597

The Labelling of Fair Exhibits as an Aid to Agricultural Production: DR. HARLAN I. SMITH 603

Scientific Events:—

The Coordination of Scientific Publication; Vital Statistics of England and Wales; Civil Engineers and the Army; War Work of Mining Engineers 604

Scientific Notes and News 607

University and Educational News 608

Discussion and Correspondence:—

Pyrheliometry and Solar Radiation: DR. C. G. ABBOT. *Reply to Professor Wilder:* COLONEL THOS. L. CASEY. *Our National Flower:* FREDERIC LEROY SARGENT, KATHARINE DOORIS SHARP 609

Scientific Books:—

Guppy on Plants, Seeds and Currents in the West Indies and Azores: PROFESSOR EDWARD W. BERRY 612

Special Articles:—

Post-glacial Continental Uplift: PROFESSOR H. L. FAIRCHILD 615

The American Philosophical Society: PROFESSOR ARTHUR W. GOODSPEED 617

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

THE ORGANIZATION OF THE MEDICAL PROFESSION FOR WAR[1]

I FEEL greatly honored by the election to the position of president of the American Medical Association. I recognize not only the honor but also the responsibility of assuming the leadership of the organized medical profession of the country at this time. The war has made unusual and exacting demands on us. The government and the people are looking to us to furnish in this great emergency not only the necessary number of medical men for the Army and Navy, but also the highest degree of medical service and efficiency. This is proving to be a war not simply between well-organized armies but between efficiently organized nations. It is now clear that in order to win the war we must organize the entire nation in such a way that every man and woman must become a useful part of a great and powerful national military machine. No part of such a great national organization is more important than the medical profession, and on this, the opening evening of this great war meeting of American physicians, it is my purpose to address you on the organization of the medical profession for war.

ORGANIZATION OF THE ASSOCIATION

There are in the United States more than 145,000 men and women licensed in the various states to practise medicine. Of these more than 81,000 are members of the

[1] Part of the president's address by Arthur Dean Bevan, M.D., Chicago, before the American Medical Association at the Sixty-ninth Annual Session, Chicago, June, 1918. The address is printed in the *Journal* of the American Medical Association.

American Medical Association, and more than 45,000 are Fellows. The American Medical Association is organized along the most democratic and representative lines. No profession in this or in any other country is more thoroughly and efficiently organized than the American Medical Association. The unit of the organization is the county medical society. It is the avowed purpose of the county society to receive into its membership all reputable practitioners who are legally qualified to practise medicine. The county medical society is a democratic organization. It is not, nor is it intended to be, a select and exclusive medical society. Its functions are educational and social. It exists for the purpose of using the united efforts of the physicians of that county for the benefit of the people and for the education of its members. Any county society that is not democratic and representative is not fulfilling its proper function. By virtue of membership in the county society the physician becomes a member of his state medical society and of the national society—the American Medical Association.

During the first half century of its existence, the American Medical Association was a rather loosely organized body. It was founded for the special purpose of elevating the standards of medical education and practise. Its ideals were high, and it accomplished a great deal of good. Not, however, until its reorganization in 1901 on broad democratic and representative lines, did it become in fact the organized medical profession of the country. The American Medical Association is not sectarian, but is broad enough to include in its membership all licensed physicians who honorably practise scientific medicine.

ACTIVITIES OF THE ASSOCIATION

Since its reorganization, the American Medical Association has had a record of splendid achievement. It has succeeded in elevating the standards of medical education in this country, which has been uneven and unsatisfactory, to a position where they are as high as those in any other country. It has improved the character of medical instruction until we can now state without fear of contradiction that the medical student can obtain as thorough and complete an education here in America as anywhere in the world.

Moreover, the American Medical Association has accomplished much through its council on medical education in cooperation with *The Journal*. Through these departments it has been of great service in creating a register of licensed practitioners. A register of medical students is now kept so that the association possesses a full record of the medical career of each licensed practitioner and medical student.

The American Medical Association and its constituent state medical associations have succeeded in securing improvements in the medical practise arts of most of our states protecting the people against ignorant and inefficient practitioners and securing better public health service.

The American Medical Association has through its Council on Pharmacy and Chemistry done outstanding, pioneer work against the unscientific and unnecessary use of drugs and against the prescribing of secret formulas and "quack" medicines. It has done more than any other medical organization to place drug therapy on a sound and scientific basis.

The Journal of the American Medical Association has become the largest and most influential medical periodical in the world. It has a circulation of more than 65,000 copies, and in the best sense it is the instrument that keeps the profession in touch with the affairs of the association, with sci-

entific medicine, and through well-prepared abstracts with the current medical literature of the world.

It is now more important than ever that these admirable activities of the association should be continued and amplified, and that steps should be taken to meet the new problems that will confront the association after the war. These will undoubtedly include the stimulation of medical research, the development of an adequate American medical literature, the creation of post-graduate medical facilities not only for our own medical men, but also for the medical men from other countries, who will find here in our great democracy a welcome and opportunities in medical instruction and medical research second to none. But these things can and must wait on the one great problem that confronts us now, *the winning of the war.*

DEMANDS MADE BY THE WAR

The problem that confronts the country in this war, as far as the development of the medical departments of the United States Army, Navy and Public Health Service are concerned, can briefly be stated in this way: If we raise an army of 3,000,000 men, 10 per cent. of this number will be in the medical department, that is, 300,000 officers and men, and of these at least 25,000 must be qualified physicians and surgeons. If we raise an army of 5,000,000 men, the medical department will contain 500,000 officers and men, and it will be necessary to have between 35,000 and 40,000 qualified medical men. At present there are more than 200,000 men authorized in the Medical Department of the Army. Of these, somewhere from 20,000 to 25,000 will be medical officers, and the balance enlisted men and nurses. If we create a navy of 500,000 we shall need 3,500 medical men. If we create a navy of a million, which is probable, we shall need 7,000 medical men. The need of the Public Health Service, although more modest, will be considerable, and must be met. No one can prophesy the extent or duration of the war, but we can say with certainty that it is the purpose of the American people to create and maintain the largest and most efficient navy in the world and to organize and train and equip an army large enough to win the war.

WHO REPRESENTS THE MEDICAL PROFESSION?

The efficient organization of the medical profession of this country for war is being splendidly accomplished by the cooperation between the Medical Departments of the Army and Navy and the organized profession, the American Medical Association. It has been unfortunate that a medical advisory committee which is not in any way representative or democratic, and which has no proper function in the efficient organization of the medical profession for war, should have been called into existence. A small coterie of specialists, of gynecologists and surgeons, no matter how eminent or how successful they may have been as promoters and exploiters of special medical societies, can in no way in this great emergency and in this great democracy represent the medical profession.

RESPONSE OF THE PROFESSION

At the outbreak of the war, the American Medical Association offered to the United States government its entire organization and machinery to assist in the enormous expansion that became necessary. Through the officers of the county societies, the state societies, and particularly through the columns of *The Journal,* the needs of the government were placed before the organized profession of the country, and they responded splendidly to the call. So far

25,000 have gone into the Medical Departments of the Army and Navy. No other profession or calling has responded more promptly to the needs of the country than the medical profession. The great bulk of the medical men who have gone into the government services were members of the American Medical Association.

The demands made on the medical profession by the war are so great that it is evident that in order to secure the necessary number of medical men for the government, and at the same time prevent hardships in some communities and institutions, it is necessary to organize the entire profession of the country in a systematic way. It therefore became necessary for the American Medical Association, acting with the Surgeon-General's Office, to take a census of the available medical men in the United States in each state, in each county, in each medical school and in each hospital, and to attempt to secure from each one of these different units at least 20 per cent. of the medical men. This plan will enable the government to secure the necessary number of medical officers for an army of 5,000,000 men or more, and a navy of 1,000,000 without any great hardship to any community or to any institution. It is evident that a plan of this kind is absolutely essential, and it is the purpose of the American Medical Association through its county and state societies and its national organization to create such a systematic classification and secure the adoption of this plan. Such a plan means a voluntary draft of the medical profession by the profession itself. The medical profession will supply the men needed by the government. No conscription, no compulsion will be required.

THE HONOR ROLL

The survey has been completed, and was published in *The Journal*, June 1. It gives the honor roll of the men who have already gone into the service from each county and state society. It gives the number of men under 45 and under 55 years of age in each county and the percentage of men who have volunteered. Up to this date about 15 per cent. of the total number of men have volunteered. The Surgeon-General of the Army has called for 5,000 more medical officers, and the Surgeon-General of the Navy needs about 2,000. It becomes necessary for us to raise the total number of medical officers this year to about 30,000, which means nearly 22 per cent. of the medical men of the country.

As president of the association, I desire to call the serious consideration of each county medical society to the fact that in order to do its duty it should furnish at least 20 per cent. of its members for military service. This situation should be met fully and promptly by each county medical society. In order to prevent hardships to communities due to lack of medical service, and in order to prevent the crippling of medical schools and hospitals, no community and no institution, unless it is clearly oversupplied, should be allowed to furnish more than 50 per cent. of its medical men. As far as possible the quota from each county should be filled by men under 45 years of age. If this is not possible men up to 55 will be taken. As fast as each county fills its quota of 20 per cent.—and this should be done by each county within the next few months—the secretary of the county medical society should notify the secretary of the state medical association and the secretary of the American Medical Association of that fact.

THE SUPPLY OF MEDICAL MEN

Profiting by the experience of the great nations that entered the war in 1914, the medical profession of the country, and the

government, have very wisely taken steps to prevent the disruption of our medical schools, and I am glad to say that our national government adopted the suggestion made by the Surgeon-General to allow medical students to be commissioned in the enlisted Medical Reserve Corps and have them detailed to complete their medical education and to serve a year in a hospital as interns before they are called into active service. This was to apply to the men who have already studied medicine in the medical school proper for one year. In order to insure the further supply of medical students to meet the demands of a great and prolonged war, the effort is being made to have this apply also to the men who are taking their premedical work in universities. It is necessary to have these men continue their medical studies in order to insure the continued supply and the necessary number of medical men.

The United States is the only great reservoir of medical men in the world. The medical professions of Great Britain and France, of Italy and Belgium, and this is probably more true of enemy countries, have been well nigh exhausted by this war. They delayed making plans for a continued supply, their medical schools became disrupted, and they are already suffering for medical men in their armies and in their civil life. Major Horace B. Arnold, chairman of the council on medical education, who is on active duty in the Surgeon-General's Office looking after the problem on medical education for General Gorgas, has this matter now under consideration, and it is to be hoped that he will succeed in securing rulings that will enable our premedical students to continue their medical courses. If the need for medical men becomes very great we can adopt a continuous session and graduate men in three years. The senior students in the medical schools should have special courses in military surgery. I would recommend that if possible one or two competent medical officers be assigned to each medical school for this purpose.

EXPANSION OF THE MEDICAL DEPARTMENT

The enormous problem that was presented to the Surgeon-General's Office by the war may be realized in a striking way by the statement that the development of an adequate medical department of 3,000,000, men means that less than 2 per cent. of such a department is represented by the men in the service at the time of the outbreak of the war—that more than 98 per cent. of the men must be taken from civil life, and must be given the necessary military training to fit them for active duty in the field. This enormous problem is being adequately and splendidly met. A small medical department which existed before the war has formed the leaven necessary to change a great body of physicians coming from civil life into efficient military surgeons and efficient hospital and ambulance units. Special training camps for medical men were formed at Fort Riley, Fort Benjamin Harrison and Fort Oglethorpe. Gradually the work done by these different camps is being concentrated at Fort Oglethorpe, where an enormous military medical university of 40,000 officers and men is being created. Here the enlisted men will receive their necessary training in small and large units, and the medical officers will receive their necessary military instruction and instruction in such medical work as will peculiarly fit them for their military duties.

GENERAL GORGAS

Standing out prominently in the development of the great Medical Department of the Army is a great figure, the figure of Surgeon-General Gorgas, who in a very quiet way has demonstrated again the fact

that he is one of the greatest organizers in sanitation and in military medicine and surgery. It is most fortunate that in this emergency work of the medical department it was found in such strong and capable hands. General Gorgas is one of the great assets of this country to-day. The splendid work that he is doing he should continue to do throughout the war, and the organized profession of this country could do no greater service to the government than to make clear to the Washington authorities that they are unanimous in their support of Surgeon-General Gorgas, and regard him as the best man in the country for the head of the Medical Department of the Army.

General Gorgas has succeeded in surrounding himself with the strongest, most efficient men, and has shown great wisdom and judgment in placing specially qualified men at the heads of the many departments under his control. The men he has chosen from the regular corps as the heads of divisions are strong and efficient: it is only necessary to mention such men as Welch, Vaughan, Billings, Mayo, de Schweinitz and scores of others, who in civil life are the recognized leaders in their special field of work, recognized not only in this country, but throughout the world.

We are equally fortunate in finding the Medical Department of the Navy in the efficient hands of Admiral Braisted, who has succeeded in meeting the great expansion made necessary by the war in the most satisfactory way.

The medical profession is also proud of the splendid service that has been rendered by the Public Health Service under the able leadership of Surgeon-General Blue.

HEALTH DURING MOBILIZATION

The mobilization of this country for war is an enormous task. To create an army of from three to five million men or more, where before we had less than 100,000, and create a navy of from 500,000 to 1,000,000 is an undertaking that had never before been worked out by any country. It was necessary that this enormous mobilization should be done as rapidly as possible, and from the rapidity and the enormous size of the mobilization it was inevitable that the medical organization could not accomplish the impossible and secure at once ideal results. Yet when we compare the mobilization of the United States for war with other countries we find cause for congratulation. Up to the time of our mobilization the army of Japan had held the record for the lowest mortality of any country during mobilization, and the best care of its soldiers from a medical standpoint. In the Japanese mobilization there was a mortality of 20 per thousand. In our mobilization there has been a little less than 10 per thousand. In other words, the showing of our mobilization from the standpoint of mortality was twice as good as the record held by any country up to that time. There have been epidemics of contagious diseases, such as measles, mumps and meningitis, and the total number of cases occurring among 2,000,000 men has been somewhat startling; but when these facts are analyzed and it is found that the mortality in our army is less than the mortality in civil life of the same number of men of the same age, picked by insurance companies, we can realize what splendid results have been accomplished.

The people of this country, the mothers and fathers and wives, whose sons and husbands are in the Army and Navy, are entitled to know, and it will be a great comfort to them to know, that the health of these men is better looked out for than when they were in civil life, that the dangers that they run from disease are less than when they were in civil life, and that when

they are sick or wounded they will receive as good care, as high a class of medical and surgical service, as could possibly be obtained in civil life. This is true because our best men have gone into the medical service, and the government is providing the medical departments with every facility necessary to give our soldiers the best medical care.

THE LABELLING OF FAIR EXHIBITS AS AN AID TO AGRICULTURAL PRODUCTION

IN past years and even at this time, when increased conservation and production of food is so desirable, the people of North America invest a tremendous sum in over 2,000 county fairs and similar agricultural exhibitions. This investment loses much of its effectiveness—perhaps more than half—because of lack of labels, scarcity of labels or imperfect labels.

By labels is not meant such labels as are used in the great museums where too much attention is given to the specimen and too little to the desirable effect of the exhibit or the effect of the label, if it be present at all. Over sixteen years' experience in the American Museum of Natural History, perhaps the largest museum on the continent, convinced me that useful labels are more rare and more valuable than the exhibits.

At the Central Canada Exhibition in Ottawa was once exhibited a very interesting hand-woven fabric apparently of farmer handiwork, but close examination of the exhibit failed to reveal where it was made, by what class of people, its value, or where such fabrics could be obtained. Otherwise intelligent people have been known to lay in a stock of fall fruit, part of which spoiled before the winter was over. A label at the fair on fruit preservation would have saved this loss. When one views the machinery at a fair he is often at a loss to know for what it may be used. Many similar examples could be given. Probably more than half the people who visit a fair grope their way through without understanding many of the exhibits. They go as a lark, but could learn at the same time things that would make them more useful to the whole country. An additional investment, small in proportion to the present whole cost of fairs, would change them from amusements or casual advertisements to educational institutions resulting in diffusing the best agricultural knowledge discovered by the government experts.

An additional investment of less than one cent per exhibit would provide suitable educational labels and probably double, if not multiply the productive national value of the fairs many fold. It is not proposed that each fair should write and print its own labels. This would mean that the ignorant or least skilled would write the labels, whereas we have intelligent and skilled specialists in provincial or national agricultural departments, as well as in agricultural colleges and experiment stations. It would also mean that there would be as many labels written as there are fairs, a tremendous overlapping of effort and expense, while one writing would do for all.

It is not advocated to label each exhibit, for instance each cow, but to label each breed. In the case of large exhibits with many individuals, as of Clydesdale horses, one label would be put at each end of each row of stalls and perhaps in one or more places between.

Perhaps labels should not be made in this particular way for everything in every fair, but for those things that are common to most of the fairs. One could take the list of exhibits at a typical fair and make a label for each class of exhibits, such as Holstein cows, Plymouth Rock chickens, northern spy apples, Hubbard squash and windmills. They would not be advertisements for any firm.

Each label should be written by the leading expert in that particular sort of exhibit—breed of cattle, swine, bee, wheat, potato, apple, gang plow, threshing machine, windmill, motor, or what not. This label should be criticised by many other experts and then rewritten by a man who is an expert in interpreting facts to the people—to farmers and

others who are not scientists. Many an agricultural bulletin is not read or is thrown away by farmers because it is too technical or because what they wish to know is buried in hundreds of pages of detail too technical for their understanding. Possibly an expert advertising writer could condense the labels written by experts down to essentials and rewrite them in language understood by the average farmer. Such labels consequently could not give the name and address of the owner, price, or other local details, but each label should be an adequate article on the subject, including references to both the best literature and to that which is most available, such as experiment station reports. It should contain nothing that could be replaced by a more important statement. Possibly the labels would cover an 8×12 inch card. They would tell, for instance, which breed of cow was good for milk, which for beef, what to feed, when to water, the general values and all such useful information. They would help the city dweller to cooperate with the farmer, and also in connection with buying, storing, drying, or otherwise preserving food. They might assist mechanics to know better how to invent and to make farm machinery.

These labels could be printed by national or provincial governments and distributed to each fair management so that each exhibit might teach to the farmers and other citizens who need the knowledge the essentials of increasing and improving the country's food supply.

The labels may be bound into a book, or rather the same type may be used to print off a guide-book or elementary agricultural encyclopedia, thus killing two birds with one stone, as has been done in the case of the imperfect and incomplete preliminary edition of the Handbook of the Rocky Mountains Park Museum, where one type setting supplied a handbook and labels for 18 museums, a zoo, a paddock and other uses. The same labels may also be illustrated with lantern slides or moving pictures and thus serve as lecture notes which may be arranged in any desired order. If a local fair wishes to add advertisements or labels of unusual local products not common to all fairs, such as peanuts or sweet potatoes, these labels may be prepared and printed locally for binding in at the back. In case the local authorities wish such advertisements or labels to local products added in the body of the book, then the originating or central office may supply electros or matrix of the standard label matter.

This plan would give far more accurate labels and handbooks than if each fair had its relatively unexpert men compose the matter. It would also save the useless expense of each fair composing its own labels and setting its own type.

Harlan I. Smith

Geological Survey,
Ottawa, Canada

SCIENTIFIC EVENTS

THE COORDINATION OF SCIENTIFIC PUBLICATION[1]

The coordination of scientific publication formed the subject of a recent conference arranged by the Faraday Society under the chairmanship of Sir Robert Hadfield, when a number of interesting problems bearing on the desirability of a fuller cooperation amongst our scientific and technical societies were discussed. Both in the reading and publication of papers there is, at present, a considerable amount of overlapping and lack of coordination, with the result that much valuable work is either lost or overlooked owing to communications being made to societies which are not especially associated with the subject-matter of the investigations concerned, and much benefit would undoubtedly result from a federation of interests in this respect. Whilst there is a general consensus of opinion that it is essential to maintain the individuality of each society in regard to the reading and publication of papers, and that any attempt to pool communications for later distribution by a central organization is undesirable, much effective cooperation could be secured between kindred societies by the arrangement of joint meetings and conferences with the object of

[1] From *Nature*.

promoting united work on problems of common interest. Borderland subjects merit special consideration from this point of view.

The publication of the proceedings of such meetings in the transactions of the several societies concerned would be much facilitated by the adoption of a uniform size and type for the publications of societies dealing with allied subjects, so that each could include such papers in its journal or distribute them as self-contained reprints of a standard size. Similar uniformity is perhaps not practicable for all scientific and technical publications, but in so far as it can be adopted it would add much to the accessibility and the utility of the recorded work.

Organized collaboration is also desirable by means of which the members of scientific and technical societies should have opportunity of knowing what papers are being contributed to societies other than their own, apart from their later publication either in the journal of the society concerned or in the form of abstracts. The proposal, which, it is understood, is being considered by the Board of Scientific Societies, to publish a weekly journal of announcements would meet this want, and it is to be hoped that the board will decide to issue such a publication as soon as possible. Meanwhile, individual societies could aid in this direction by publishing in their journals both the announcements of cognate societies and short summaries of papers read previous to publication, so that the subject-matter is brought to the notice of those interested at as early a date as possible. A method of mutual exchange to facilitate such cooperation could be easily arranged, and would in no way detract from, but rather add to, the interest in the later full publication of papers.

Apart from original contributions, the publications of most societies include abstracts of scientific and technical literature published both in our own and in foreign journals. In so far as such abstracts include subjects of common interest to members of kindred societies, there is at present a great deal of overlapping which could be advantageously eliminated by organized collaboration. We have, in the past, been far too reliant in many subjects on the foreign, and especially on the German, journals for our supply of the world's scientific and technical literature, and it is high time that we became independent and self-supporting in this respect. Effective cooperation should achieve this desirable end for each group of cognate subjects; and whilst the method of collaboration would depend to a considerable extent on the character of the subject, a common journal of abstracts for each group of societies would, in the majority of cases, prove the most advantageous plan. Although a scheme of this character would necessarily decrease the bulk of the publications of each society, the original contributions which mark their individuality would be given greater prominence, time wasted by the rereading of the same abstract in several journals would be saved, and considerable economies in publication would be effected.

Much attention is being directed at present towards the unification and coordination of scientific effort. The coordination of scientific publication, which has made some progress in the directions indicated during recent years, should certainly continue to occupy a prominent place amongst these problems of reconstruction.

VITAL STATISTICS OF ENGLAND AND WALES

THE Registrar-General has made public the following statement showing the birth-rates and death-rates and the rate of infantile mortality in England and Wales and in certain parts of the country during 1917.

ENGLAND AND WALES

Birth-rate, Death-rate and Infant Mortality during the Year 1917 (Provisional Figures)

	Birth-rate per 1,000 Population	Civilian Death-rate per 1,000 Civilian Population	Deaths Under One Year per 1,000 Births
England and Wales	17.7	14.4	97
96 great towns, including London (population exceeding 50,000 at the census of 1911)	18.0	14.6	104
148 smaller towns (populations from 20,000 to 50,000 at the census of 1911)	17.9	13.1	93
London	17.4	15.0	103

The following table, by the *British Medical Journal* compiled from the statements published for ten years, will be of interest. The figures (not standardized) of the death-rates do not disclose any very distinct movement; the deaths of infants appear to indicate a slight increase. The most disquieting set of figures are those showing a further marked decline in the birth-rate since 1914.

ENGLAND AND WALES

	Births per 1,000 Total Population	Deaths per 1,000	Deaths Under One Year per 1,000 Births
1908.....	26.5	14.7	121
1909.....	25.6	14.5	109
1910.....	24.8	13.4	106
1911.....	24.4	14.6	130
1912.....	23.8	13.3	95
1913.....	23.9	13.7	109
1914.....	23.6	13.9	105
1915.....	21.9	15.1	110
1916.....	21.6	14.0	91
1917.....	17.7	14.4	97

CIVIL ENGINEERS AND THE ARMY

The War Department states that two thousand engineers are needed immediately by the United States Army for commission as first lieutenants and captains. The chief of engineers has outlined a plan of campaign by which it is hoped to obtain the men needed without delay. A board of examiners will be sent out from Washington to visit about 33 principal cities.

Engineers, civil, mechanical, mining and electrical, will have an opportunity to go before the board and be examined. Those passing the examinations will be commissioned at once and sent to an engineer officers' training camp, either at Camp Lee, Petersburg, Va., or Camp Humphreys, Va., near Washington. They will be on officers' pay while training and at the completion of their courses will be assigned at once to duty with the engineer troops.

Engineering societies and institutes will be provided with application blanks to be distributed among their members and friends in the profession. Engineers who do not obtain blanks in this way should address the Chief of Engineers, United States Army, Washington. These forms, when properly filled out, should be returned to Washington. After they have been scrutinized with a view to ascertaining the fitness of the applicants, word will be sent out telling the men when and where to appear for mental and physical examinations.

Following are the requirements that must be met:

Age Limits.—First lieutenants, 32 to 36 years; captains, 36 to 42 years. These limits may be extended in special cases, but no man of draft age will be considered.

Citizenship.—All applicants must be citizens of the United States.

Qualifications.—Applicants must be actively engaged in the practise of the engineering profession, and be in good physical condition. No set rules have been adopted as to professional qualifications and experience. The examining board will determine each applicant's case. Applicants must possess the requisite qualities of leadership and temperament to fit them for the command of troops.

It is the hope of the chief of engineers to have all men who pass the examinations commissioned within ten days or two weeks. Traveling expenses of 7 cents a mile to the training camp will be allowed to those who receive commissions.

WAR WORK OF MINING ENGINEERS

Heads of practically every "war-work" division of the government will discuss vital war problems with 200 of the country's leading mining engineers, representing the American Institute of Mining Engineers, at a dinner in the Food Administration Cafeteria on the evening of June 21. To learn new ways in which the mining engineer can contribute his services, already great, toward the winning of the war is the aim of the gathering, which has been planned in honor of the board of directors of the institute. There are some 700 of the institute's membership of 6,700 devoting their entire time to war service.

Those who will discuss future work for the institute in the war are practically all members of the institute. They include Herbert

C. Hoover, food administrator; Charles M. Schwab, director-general of the Emergency Fleet Corporation; John D. Ryan, director-general of the Aircraft Production Board; Vance McCormick, chairman of the War Trade Board; W. L. Saunders, chairman of the Naval Consulting Board; Mark L. Requa, head of the Oil Division of the Fuel Administration; Sidney J. Jennings, president of the American Institute of Mining Engineers; Benedict Crowell, Assistant Secretary of War, and Pope Yeatman, of the War Industries Board. Francis Peabody, chief, explosives section, Bureau of Mines, will be the toastmaster.

Members of the American Institute of Mining Engineers are active in a wide field of war work including the Engineer Officers' Reserve Corps, Ordnance and Signal Corps Branches of the Army and Navy, Aircraft Production, Food and Fuel Administrations, War Industries Board, War Trade Board, and the Department of the Interior. Several members of the institute have also joined the Royal Engineers of the British Army. The arrangements for the conference are in charge of Van H. Manning, director of the Bureau of Mines. In the afternoon the board of directors of the institute will hold a meeting at the Bureau of Mines.

At a meeting on June 20 a Washington section of the American Institute of Mining Engineers was formed. Although remote from the country's mining centers, Washington now contains more mining engineers than any other city.

SCIENTIFIC NOTES AND NEWS

DR. ALEXANDER LAMBERT, of the College of Physicians and Surgeons, Columbia University, was elected president of the American Medical Association at the Chicago meeting on June 13. Admiral W. C. Braisted, Surgeon-General of the Navy had a nearly equal number of votes. Dr. Lambert is medical director of the American Red Cross work in France, and president of the New York State Medical Association.

AT the recent commencement of New York University, the degree of LL.D. was conferred on Surgeon-General William C. Gorgas, and the degree of doctor of public health on Dr. Charles Edward Amory Winslow, professor of public health at Yale University.

AT its commencement exercises held on June 12, St. Lawrence University conferred the degree of doctor of laws on Dr. Frederic S. Lee, professor of physiology in Columbia University.

SIR NAPIER SHAW, president of the International Meteorological Committee, has been appointed scientific adviser to the British government for the period of the war. Sir Napier has been director of the British meteorological office since 1905.

OLIVER HEAVISIDE, the distinguished English mathematical physicist, has been elected an honorary fellow of the American Institute of Electrical Engineers. The only other honorary fellows are: Marconi, Ferranti, Blondel and C. E. L. Brown.

PROFESSOR L. V. KING, of the Macdonald Physical Laboratories, McGill University, was elected president of Section III., Chemical and Physical Sciences, at the thirty-seventh meeting of the Royal Society of Canada, recently held in Ottawa, Canada. Professor King has been carrying on a series of practical researches for anti-submarine warfare and other work on behalf of the British Admiralty.

THE Franklin Institute has awarded the Howard N. Potts medal to Dr. Alexander Gray, of Ithaca, N. Y., for his paper, entitled "Modern dynamo electric machinery," which is "an exhaustive discussion of the design of dynamo electric machinery." The institute has awarded its Edward Longstreth medal of merit to Professor H. Jermain Creighton, of Swarthmore College, for his paper, entitled "The deteriorating action of salt and brine on reinforced concrete," which presents "the results of an original and scientific investigation in a matter of great practical importance. An Edward Longstreth medal of merit has also been awarded to Dr. J. B. Whitehead, of Baltimore, for his paper, entitled "The electric strength of air and methods of measuring high voltage," which gives "a clear exposition of

the underlying principles of the phenomenon of the electric corona at high potentials."

Lord Rothschild has been elected an honorary member of the recently founded Entomological Society of Spain.

Samuel R. William, professor of physics at Oberlin College, has been appointed Ernest Kempton Adams fellow by Columbia University.

Sir William Arbuthnot Lane, consulting surgeon to Guy's Hospital, Sir James Mackenzie, physician to the London Hospital, and Colonel Herbert A. Bruce, consulting surgeon of the British Armies in France, are now in this country to attend American medical conferences.

Major George W. Norris, of the University of Pennsylvania, who went to France nearly a year ago with Base Hospital No. 10, now No. 16, with the British Expeditionary forces, has been assigned, in addition to his other work, consultant in general medicine for Advance Section S. O. S., Zone of the Advance. He is attached to the American Expeditionary forces.

W. A. Cochel, for six years head of the department of animal husbandry, Kansas State Agricultural College, has resigned his position to become secretary of the American Shorthorn Breeders' Association. He will probably continue to make his home in Manhattan.

President W. A. Jessup, of the University of Iowa, has received a letter from Professor C. C. Nutting, head of the expedition to the British West Indies, stating that the party had reached the island of Barbados safely after a thirteen-day voyage from New York City. Each of the nineteen members in the company is in good health, and prospects are favorable for a successful outcome. The explorers are now in government quarters and have equipped excellent laboratories and aquariums for the study of sea life.

Professor Vaughan MacCaughey, professor of botany at the College of Hawaii, Honolulu, will have charge of the courses in biology and field natural history at the Chatauqua Institution Summer Schools, Chatauqua, New York. En route he will lecture at educational centers on "The Islands of the Pacific and the World War."

Sir Alexander Pedler, F.R.S., known for his research work in chemistry, for many years professor of that science in the Presidency College at Calcutta, later vice-chancellor of the Calcutta University and minister of public instruction in Bengal, died on May 13, aged sixty-eight years.

The death is announced in *Nature* of Dr. R. G. Hebb, consulting physician and physician pathologist to Westminster Hospital, lecturer on pathology at Westminster Hospital Medical School, reader in morbid anatomy at the University of London, and editor of the Journal of the Royal Microscopical Society.

The Civil Service Commission announces a registration examination for geodetic, hydrographic and magnetic computors in the United States Coast and Geodetic Survey. This is a continuing examination and the entrance salary is $1,200 per annum. Detailed information regarding the requirements and the work done by the computers will be furnished upon application to the U. S. Civil Service Commission or to the U. S. Coast and Geodetic Survey, Washington, D. C.

UNIVERSITY AND EDUCATIONAL NEWS

A $50,000 bequest to the University of Pennsylvania is included in the will of the late Dr. William C. Goodell, to be used to endow a chair of gynecology.

A letter from the department of registration and education of the state of Illinois, states that after October 15, 1918, no medical college will be recognized as in good standing in Illinois unless it requires for admission two years of work in an approved college of liberal arts or a fully equivalent education.

The University of Wisconsin reports the receipt of gifts amounting to $100,000 which, with an appropriation of $50,000 from the legislature of 1917, will be used in the construction of a new infirmary for the medical school.

Dr. H. L. Rietz, of the University of Illinois, has been made head of the mathematics at the State University of Iowa. He will suc-

ceed Professor A. G. Smith, whose death occurred in the fall of 1916.

APPOINTMENTS at Cornell University have been made as follows: F. K. Richtmyer, professor of physics; John B. Bentley, jr., professor of forestry; Charles L. Gibson, professor of surgery, to succeed the late Professor Stimson; John A. Hartwell, associate professor of surgery and William C. Thro, professor of clinical pathology, Medical College, New York.

WILLIAM S. TAYLOR, acting professor of rural education at Cornell University, has been appointed professor of agricultural education at Pennsylvania State College.

DR. A. R. CUSHNY, F.R.S., professor of materia medica and pharmacology in the University of London (University College) since 1905 has been appointed to the chair of materia medica in the University of Edinburgh. Dr. Cushny was professor of pharmacology in the University of Michigan from 1893 to 1905.

DISCUSSION AND CORRESPONDENCE

PYRHELIOMETRY AND SOLAR RADIATION

TO THE EDITOR OF SCIENCE: I hope it may interest your readers, and more fully explain the discrepancy between Professor Bigelow's work and mine, if you can find space for the accompanying letter.

MAY 14, 1918

My dear Professor Bigelow:

1. I received yesterday from your publishers a complimentary copy of your new book entitled "Treatise on the Sun's Radiation." You are kind to have it sent to me.

2. I received to-day your communication on a 26.68-day solar synodic period.

3. Some time ago I received some other data from you relating to observations and computations of radiation.

4. While I appreciate your kindness in remembering me personally, I am obliged to tell you that I can not at all accept your views and I do not think you either fully understand or fairly weigh our work. My reasons are partly given below.

5. Among the words you use most is "Pyrheliometer." We carefully made and standardized Silver Disk Pyrheliometer S. I. III., at your request, and sent with it an accurate description of the method by which it must be read and reduced in order to give results to correspond with its constant of calibration. In your book "Atmospheric Circulation and Radiation," pages 263 to 267, I am surprised to see that you describe and *prescribe* another method of using it whereby it *can not give results agreeing with its constant of calibration.*

6. You use this word "Pyrheliometer" and its modifications often very objectionably when you mention our work. You make it appear as if we attach weight to empirical processes of extrapolation of total radiation of all wave-lengths combined. If an observer could operate on the moon, a pyrheliometer would be a very much more valuable instrument than it is here, and I believe you and others could not then avoid the true conclusions as to the value of the solar constant. Unfortunately, owing to the unequal transparency of the earth's atmosphere for rays of different wave-lengths, it is absolutely necessary to use spectrum-energy analysis to measure the solar constant of radiation, as Langley showed. We use a linear bolometer to measure the intensity and changes of intensity of all parts of the spectrum. We have employed it at Washington, Bassour, Hump Mountain, Mount Wilson, and Mount Whitney. In our experiments the solar beam traversed paths of air ranging from that where the sun was nearly vertically overhead at Mount Whitney, to that with the sun on the horizon at Mount Wilson. Anybody interested can learn exactly how we worked by studying our published papers, particularly Volumes II. and III. of our *Annals* and our paper "New Evidences on the Intensity of Solar Radiation Outside the Atmosphere," Smithsonian Miscellaneous Collections, Vol. 65, No. 4.

In all this work we treat the pyrheliometer as a subsidiary instrument. Its sole use and purpose in our investigations is to enable us to express the readings of the bolometer in calories.

As a result of spectro-bolometric investigations over fifteen years of time, we have shown that the solar constant is 1.93 calories, and the sun an irregular variable star. Others, Clayton and Bauer particularly, have shown how the solar variations we have discovered affect terrestrial things. If our results were wrong these correlations would not be found.

7. Not everybody has a spectro-bolometer. You haven't any, for one. From a wealth of experience that nobody else in the world ever had in the measurement of solar radiation, we have put out some tabular data and empirical formulæ connecting pyrheliometry and psychrometry with the solar constant. We did this, not because we had any occasion for them ourselves, but so that observers

who had pyrheliometers, but couldn't afford the expense of money, time, and experience necessary to really observe solar radiation satisfactorily by spectrum-energy work, might get approximate results of at least moderate value. It is to be distinctly understood that these empirical methods of solar constant work by pyrheliometry, though based on our work, are likely to yield results several per cent. from the truth, owing to differences in the atmospheric transparency due to various causes, and especially to the variable influence of water vapor. Pyrheliometric methods are mere economical make-shifts when unaccompanied by spectrobolometry.

8. You are, I am certain, misled in your attack on our use of Bouguer's formula of extrapolation when applied as we applied it to homogeneous rays. See for instance our paper "New Evidences on the Intensity of Solar Radiation Outside the Atmosphere." Logically conceived the mathematical treatment consists in diminishing the path of the sunrays in every layer of the atmosphere proportionally until none remains. The fact that this can not *conveniently* be carried through *experimentally* beyond the point corresponding to the atmospheric thickness found in a vertical solar beam does not prove that a continuation such as can be logically conceived up to the point where each thickness becomes zero is mathematically unsound. Imagine, for instance, a tube to be erected from the observer to the outside of the atmosphere, and by side tubes appropriately dimensioned let the atmosphere within the tube be exhausted until none remains. This fits the logical process applied with Bouguer's formula. No mathematician but you can see in it anything objectionable, so far as I know.

9. In order to verify, as far as could be done, the sound theoretical and experimental conclusion that if the standard pyrheliometer could be read on the moon at mean solar distance it would read there on the average 1.93 calories per square centimeter per minute, we sent up a registering pyrheliometer by balloon to 22,000 meters in 1914 and found there 1.84 calories, which is a very reasonable check.

10. You have exterpolated your thermodynamical discussion of meteorological measurements into the realms of the thin air above 22,000 meters, and into the realms of the sun, which is out of the range of laboratory conditions altogether. Your results widely disagree from those I have just quoted. It seems to me not to matter who makes the curves, whether yourself or another; by the time they get outside the well-observed range of atmospheric data, say 20,000 meters, even though they are sound at the bottom (and this I am not quite sure of), they rank rather as interesting speculations than as having quantitative value.

By authority of the Secretary:

Yours truly,

C. G. Abbot,
Director, Astrophysical Observatory

Professor Frank H. Bigelow,
Solar and Magnetic Observatory,
Pilar, Argentina.

REPLY TO PROFESSOR WILDER

Being much interested in a short article by Professor Wilder, appearing in Science of April 19, on the subject of "*Desmognathus fuscus* (sic)," it occurred to me that a few remarks might not be inappropriate. The object of the nomenclatorial code in zoology, as I assume Professor Wilder recognizes as fully as any other zoologist, is primarily to afford a means of naming the various species of animals. In view of this I think it will be admitted that philological conditions should play a secondary rôle to consistency and permanence. Most zoologists are in favor of ridding nomenclature of the idiosyncrasies continually occurring in language, in order to bring about absolute uniformity so far as may be possible. This tendency can be traced easily. In former times it was the custom, for instance, to begin all specific words founded upon proper names with the capital letter; then, the desirability of uniformity becoming increasingly evident, only specific designations founded upon the names of persons were so written; at the present time, in all parts of the world excepting continental Europe, the custom prevails of beginning all specific names, including the personal, with a small letter. It is now *Omus edwardsi,* for example, and not *Omus Edwardsii,* as originally published, the adoption of the single *i* in all cases to form the genitive ending, being another recently adopted rule formulated in the sole interest of uniformity. All this should horrify the philologist quite as much as the disregarding of irregular Greek genders.

Now in regard to genders, it is considered desirable by many systematists—and their

number is continually increasing—to adopt rules as uniform as that affecting capitalization; that is to say, generic words having a given form of ending should demand a gender ending in the specific word conforming to the general Latin rule, ignoring the accidental exceptions of language. So generic words ending, for instance, in *us, os, ax,* etc., require in every case the masculine form of the specific name, those ending in *a, is, e,* etc., the feminine and those ending in *m* or *n* the neuter. Personally, I should even be in favor of writing *Venus mercenarius,* instead of *Venus mercenaria,* first of all to agree with the uniformity rule mentioned, but also, in this special case, because the goddess of love can not be a clam, and the word *Venus* in *Venus mercenarius* can not therefore stand for the goddess of love, but is merely a word resembling her designation, though masculine for nomenclatorial purposes.

Furthermore, in alluding to Greek genders it should be remembered that when a word derived from the Greek, Arabic or Hottentot, or arbitrarily composed of a pronounceable series of letters, becomes the name of a genus modified by an adjectival Latin specific name, the genus word can no longer be Greek, Arabic or Hottentot, but automatically becomes Latin and should demand gender endings in the specific word in accordance with the most general Latin rules alone. It is only by adopting rules rigidly fixed such as this that nomenclature can be rendered practically stable, and this is an end that all zoologists would rather see than strictly philologic purity, which, conforming to all sorts of linguistic vagaries, would give to it a piebald character certainly very undesirable and inconsistent with uniformity, which is the most essential requisite of any nomenclatorial code.

Finally, it might be added, biology has nothing closely in common with philology. We simply have to use words of some kind to express ideas and name the different forms of animal life, but this language should be invented by biologists for their own ends and not made to conform to the pitiful mixture of contradictions and exceptions constituting actual human language, either ancient or modern.

THOS. L. CASEY

WASHINGTON, D. C.,
May 11, 1918

OUR NATIONAL FLOWER

TO THE EDITOR OF SCIENCE: In confirmation of the admirable plea for the columbine by Albert A. Hansen (SCIENCE, April 12, 1918) may I call attention to a few additional facts regarding its unique fitness to be our national emblem, and the support it has already received? A history of earlier efforts in The National Flower Movement is given by the present writer in the *Transactions of the Massachusetts Horticultural Society,* Part I., 1898; where will also be found a full discussion of the merits of various candidates.

The idea of having our native columbine for national flower occurred independently to several persons during the time of preparation for the Columbian Exposition at Chicago; and in 1895 there was organized the Columbine Association whose object is, by spreading information of its fitness, "to bring about the official adoption of the columbine as the national flower of the United States." The following year a National Flower Convention composed of delegates from the various states of the Union, chosen by their respective governors at the request of Governor Elias Carr of North Carolina, met from the twenty-first to the twenty-third of October at Asheville to decide upon the most suitable flower for our national emblem. With a view to helping future decision it was unanimously

Resolved, That a plant to serve properly the purposes of a national flower should meet the following conditions:

1. It should be a native of the United States, and should grow wild over the greater part of its area.
2. It should bloom on one or more of our national holidays.
3. It should be capable of easy cultivation in any garden.
4. It should not be a weed, or in any way offensive, or harmful to health.
5. It should bear what in the popular sense is called a flower, and should not be merely a foliage plant or one chiefly valued for its fruit.

6. It should lend itself readily to floral decoration by variety and purity of color and distinctiveness of form.

7. The features characteristic of its form should combine such simplicity and gracefulness that, when used conventionally in decorative design, the flower may be readily recognized independently of its color.

8. It should be a flower which has never been used by any other people as their emblem, and not resemble such a flower in general form.

9. It should possess, if possible, patriotic associations plainly connecting it with the best for which our country stands among the nations of the world.

While the convention deemed it inexpedient to make any recommendation of a special flower at that time it was evidently the sense of a majority of the delegates present, as shown by an informal vote, that the columbine, or aquilegia (sometimes known as wild honeysuckle) is the only flower which meets the requirements set forth in the above resolution.

Beside the columbine's qualifications advanced by Mr. Hansen, the following are noteworthy. Short-spurred forms of the flower, native to our Rocky Mountains and to the home of Columbus, resemble so closely a group of doves that the flower's name—like that of the great discoverer, and our national title Columbia—is derived from the Latin *columba,* a dove. Thus, the same flower which rides our mountain storms like an American eagle becomes in quiet valleys a dove-flower symbolizing peace. One of its short-spurred nectaries bears remarkable resemblance to a liberty-cap; those of moderate length are miniature horns of plenty; and the longest are golden trumpets proclaiming Columbia's ideal of liberty, whence comes the peace that makes for plenty, the plenty that makes for power, and the power that makes for peace. A columbine leaf with its many leaflets in organic union, the leader among them having thirteen lobes, aptly recalls that mutual loyalty which the founders of our thirteen original states implied in their motto *e pluribus unum.*

Frederick LeRoy Sargent
Cambridge, Mass.

The article on the above subject in the April 12 number of Science is timely, inasmuch as, if we do not hurry, all the best flowers will be selected ahead of the nation. Even the one Mr. Albert A. Hansen proposes has already been preempted by Colorado.

The *Aquilegia canadensis* is a charming spring flower, well worthy the compliment he pays it, but I will mention a few objections. In the first place, it would be a trespass upon that state's rights to select their flower, especially when there are so many others to choose from. Then its name, *canadensis,* indicates that is was first made known from Canada, which is no part of America, as we wish it to be known, the U. S. A. The chief objection to the wild columbine is that it falls to pieces so readily. This prevents it from being a valuable addition to a bouquet, or for decoration. After the petals have fallen, only the ragged follicles remain. Nor is it extremely common in this part of the country, the specimens I have growing in my garden coming from a start procured with some difficulty.

Some years ago, the goldenrod was proposed for the national flower of America and I have often wished that it might be adopted. There are 47 distinct species of this plant mentioned in Britton and Brown's "Flora," almost as many as the states in the Union. Perhaps one or two more may be discovered to make the number exact. All are of the same color, yellow, like sunshine, symbolic of cheerfulness. The goldenrod belongs to the Composites, the "many in one" family of flowers; and its botanical name, *Solidago,* means to make whole. It is a universal plant in this country, and one species, *Solidago juncea,* blooms from June into November. This is a handsome variety and bears cultivation, as do most of them.

Columbia's flower, the goldenrod, on hill and valley grows;
The gold is for the one who earns, the rod is for her foes.

Katharine Dooris Sharp
London, Ohio

SCIENTIFIC BOOKS

Plants, Seeds and Currents in the West Indies and Azores. By H. B. Guppy. London, 1917.

Although published last year I experienced considerable difficulty in getting a copy of this book, nor have I noticed any reviews of it in American botanical periodicals. Guppy has long been a student of the sea drift, and strand floras as influenced by ocean currents, and in his well-known book "Observations of a Naturalist in the Pacific," published in 1906, he gave an exhaustive study of insular floras and plant dispersal in that region, as well as some interesting but less profitable discussions of the geological eras of the floral history as he conceived them.

The present volume presents the results of similar studies carried out during the period from 1906 to 1914 in the Antillean region and the Azores. It is just the sort of a book that we have been waiting and wishing for, and in addition to the wide general audience it makes an especial appeal to those who are interested in the geological history of the Antillean region and the relations of the floras and faunas of its perimeters. It undoubtedly contributes toward a solution of paleontological problems and enables them to be viewed from the various angles necessary to their ultimate proof or disproof.

One conclusion of especial interest, in view of the manner in which some paleontologists subscribe to isostacy and think therefore that the permanence of ocean basins is proven, may be illustrated by the following quotation from the preface: "The great lesson that I have learned from the numerous difficult distribution-problems presented in the West Indian region is that one can no longer fight shy of accepting in principle the conclusions relating to past changes in the arrangement of land and water in the Caribbean area, which have long been formulated by English and American geologists and zoologists. The witness of the living plant is often quite as insistent as the testimony of the rocks." He might have added that this statement loses no force from a consideration of the fossil plants.

For the plant geographer every chapter is packed with information, and the fact that the geological history of both the land and its floras is not ignored gives an outlook and a basis for deduction that are altogether admirable. Without attempting an elaborate abstract or analysis of Guppy's results I wish to mention several aspects of the work that are of especial interest to students of earth history.

Chapter II. is a fine summary of personal observations and the scattered and inaccessible records in the older literature going back to the days of Clusius (1605), of West Indian drift on European shores. This is exceedingly interesting, not only as an illustration of the unsuspected variety of plants represented and distances traversed, but also of the relative frequency of such trans-Atlantic journeys. These may be given point by the fact that in the Hebrides, Orkneys, Shetland and Faroe islands as well as in Scandinavia, snuff, tinder and match boxes made from *Entada* seeds derived from the stranded drift from tropical America have always been highly prized by the natives. Mr. Guppy is apparently unaware that similar *Entada* seeds have reached a resting place in some of the Scandinavian peats after a similar voyage in the late Pleistocene. I mention this, not because it is of any especial importance in the present connection, but as a fact of added interest. Many of these stranded ocean waifs, such as the seeds of *Guilandina, Erythrina* and *Ipomœa tuberosa,* have a mystical or superstitious value and are often handed down from generation to generation as charms among these out-of-the-way peoples.

Most seeds after such a long voyage have lost their germinative capacity, even were not the European climate prohibitive. Some, however, retain their vitality, and this has been demonstrated experimentally in the case of *Entada, Guilandina* and *Mucuna,* and is conceivable in the case of *Sapindus, Ipomœa, Dioclea* and *Erythrina,* so that in the early Tertiary, when the climate was much more uniform and mild than it is at the present time in the far north, it is conceivable that certain tropical American forms may have reached Europe in this way.

A highly instructive chapter is that devoted to the similarity between the strandflora of

West Africa and tropical America. This has long been known to botanists and often discussed, as, for example, by Schimper and Engler. The latter is inclined to insist that the present distribution demands a land connection, and this hypothesis is heightened by the usual assumption of such a land bridge by paleogeographers based on the distribution of littoral faunas, the absence of marine Tertiary deposits on the facing coasts, the evidence of the foundering of earth blocks in certain areas, and the absence of Mediterranean elements in the early Tertiary marine fauna of Patagonia.

If the community of floras on the two sides of the tropical Atlantic was entirely confined to strand types the conclusion would be inevitable that this was due entirely to the action of ocean currents, but such is not the case, nor are these features confined to the Recent floras, for in the Tertiary floras of our Gulf states a number of genera common to West Africa and tropical America had already made their appearance.

An important conclusion of Guppy's is that the sphere of influence of the ocean current in determining plant distribution between the Oriental and Occidental tropics is limited, and that their action leaves the main facts of general distribution unconfused. In the comparison of the floras of the West African and American tropical littoral the most direct journey, namely from the former to the latter via the Main Equatorial current, requires that a fruit or seed will float unharmed for from two to three months. The results for 53 species are embodied in a table showing that 6 mangrove, 7 estuary and riverside, and 19 beach plants, or 60 per cent., are found in both regions, and of these 88 per cent. show experimentally that they possess the required buoyancy and resistance to enable them to make such a journey.

While the evidence is only negative it may be noted that the oldest known fossil occurrences of the genera *Rhizophora, Avicennia, Laguncularia, Canavalia, Dodonæa, Chrysobalanus, Conocarpus* and *Carapa* are American. Guppy's discussion is eminently open-minded and shows conclusively that most of the common species have the necessary powers of resistance, while only 24 per cent. of the strand plants confined to the American tropics possess fruits or seeds capable of making the trans-Atlantic trip. I am, however, inclined to dissent from his conclusion, at least as regards its application during the Tertiary, namely, that since the Main Equatorial current offers the easiest avenue of distribution, this distribution has been from east to west. The more general conclusions derived from a study of geological distribution point in many cases to an original distribution from west to east. The fact that genera like *Moschoxylon* (Meliaceæ) with about three score existing species in tropical America and West Africa has fossil species in the lower Miocene of Chile and Colombia indicates that other explanations than dispersal by ocean currents are involved, and the distribution of the family Humiriaceæ is another illustration of the same kind. Many such instances are given in a recent discussion of fossil floras.[1]

This is not the place, however, to elaborate this thesis since the distribution of the recent floras of the two regions is fairly well known and Guppy's work concerns only the littoral species and in discussing these he is never dogmatic.

The chapter devoted to the current connections in the Southern Hemisphere, based largely on records of bottles and wreckage, is also exceedingly interesting, but the time involved in such journeys between these outlying land masses is too great to be a large factor in the curious similarities of elements in antipodean floras, which are really results of geological history. Moreover there is rather definite evidence of land connection, especially the early Tertiary connection of Graham Land and Patagonia, at which time *Fagus* and *Nothofagus,* as well as other northern derived types appear to have invaded Patagonia and Chile from the Antarctic.

For shorter distances currents may have been important factors, *e. g.,* tropical Australia

[1] U. S. Geol. Survey Professional Paper 91, pp. 72–140, 1916.

and tropical East Africa have reciprocating currents, while the south coast of Australia receives drift from South Africa and southern South America. Similarly southeastern Australian drift would tend to reach the north end of New Zealand. If the data were only sufficient for the construction of accurate paleogeographical maps for those times of land extension during the Tertiary and Quaternary and if the ocean currents could then be plotted upon these, doubtless much light would be shed on many anomalies of distribution.

Work like that of Guppy, interesting and important as it undoubtedly is, can hardly be said to furnish more than analogies and a basis for theory, since the distribution of most of the orders of plants was a much more ancient process, and unless we are prepared to subscribe to similar continental outlines, climates and ocean currents during the Tertiary, all three assumptions which are negatived by what we already know of geological history, we have many other factors than are furnished by existing conditions which must be taken into account.

The chapters headed Differentiation and Distribution are eminently sound in principle and should give plant geographers much food for thought. It is a great pity that in this connection the author seems to be unfamiliar with considerable recent American literature on this subject.

A special chapter is devoted to the distribution of *Sphagnum* and *Carex,* and the Azores occupy the three concluding chapters, while an appendix contains over fifty additional pages of valuable matter.

The book is well written and well printed and is a mine of information which is illuminated throughout with ideas, and it should find a place in every well-equipped library.

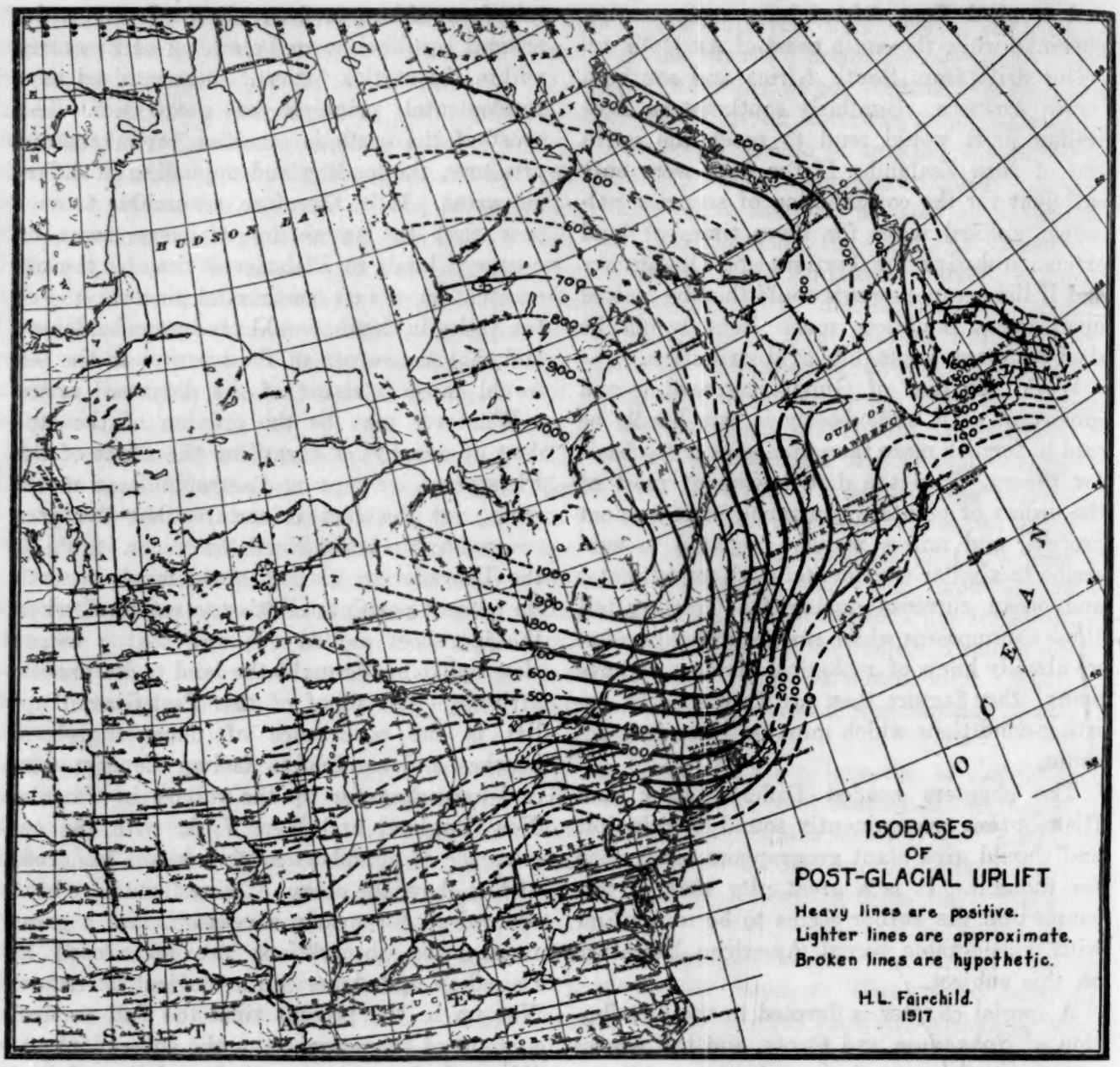
EDWARD W. BERRY
JOHNS HOPKINS UNIVERSITY,
BALTIMORE

SPECIAL ARTICLES

POST-GLACIAL CONTINENTAL UPLIFT

THE rise and fall of great areas of the earth's surface (diastrophism) is one of the most certain facts of human observation. Isostacy, the general equilibrium or balancing of pressures within the earth's "crust," is recognized as a fundamental principle of geophysics. The crust of the earth is sensitive to unbalanced pressures, the loading and unloading of different areas. It is, therefore, reasonable to suppose that the weighting of large areas of northern lands in Pleistocene time by the accumulation of vast continental glaciers, one or two miles in depth, would produce subsidence; and that the return of the ice caps to the sea would cause uprising of the depressed areas.

Whatever may be the opinion of the student of geophysics regarding the effect of the Pleistocene ice caps on diastrophic land movement, yet the fact is certain that the area covered by the latest North American ice sheet, the Labradorian glacier, stood much beneath its present position, relative to sea level, when the ice sheet melted off; and that a recent slow uplift has brought the land to its present attitude. The proof of this Post-Glacial uplift is the occurrence of many high-level beaches and sandplains facing the open sea, and extending far up the valleys in Canada, New England and New York, with the occurrence of abundant marine fossils hundreds of feet above the ocean. These facts have been recognized for nearly a century, and a great number of observations are on record in Canadian and American geological literature. Yet up to the present time the full vertical amount of submergence, or the subsequent uplift, and the extent or limits of the affected area have not been determined beyond dispute. The total amount of the down-and-up movement has nearly always been underestimated, for the reason that the conspicuous or more evident marine features are of inferior and later levels, while the initial and summit shore features are commonly weak and unobtrusive, or they lie so far inland and are so detached as to be unrecognized, or their origin and relationship misinterpreted; usually being referred to glacial agency. Yet the summit or initial level at any locality is the one critical and essential element in the diastrophic problem.



The determination in recent years of the upraised marine plane throughout the Hudson-Champlain and Connecticut valleys afforded a good base line for more extended exploration.[1] During the summer of 1917, with financial aid from the research fund of the American Association for the Advancement of Science, the writer has been able to determine with precision, or with close approximation, the amount of Post-Glacial land uplift over New England and eastern Canada, as shown by the accompanying map.

On the small scale the map is, of course, somewhat generalized, but it is confidently believed to fairly represent the truth. The broken

[1] "Pleistocene Marine Submergence of the Connecticut and Hudson Valleys," *Bull. Geol. Soc. Amer.*, Vol. 25, 1914, pp. 219–242.

"Pleistocene Uplift of New York and Adjacent Territory," *Bull. Geol. Soc. Amer.*, Vol. 27, 1916, pp. 235–262.

"Post-Glacial Marine Waters in Vermont," Report of Vermont State Geologist for 1915–16. pp. 1–41, 1917.

"Post-Glacial Submergence of Long Island," *Bull. Geol. Soc. Amer.*, Vol. 28, 1917, pp. 279–308.

"Post-Glacial Features of the Upper Hudson Valley," New York State Museum, Bull. No. 195, 1917.

lines are entirely hypothetic only in the Mississippi Valley, where there was probably some land uplift during the closing glacial epoch, the time of the Labradorian glacier. Except in the district west of Indiana and Michigan the map is intended to show only the Post-Wisconsin uplift, or the rise of the continent subsequent to the removal of the latest (Labradorian) ice sheet.

For Labrador and Newfoundland reliance is placed on the published figures of R. A. Daly, with some help from unpublished data of A. P. Coleman and J. B. Tyrrell.

Shoreline or beach features, bars and cliffs, are relatively uncommon at all stages of the uplifting, and rare at the primitive or summit plane of the sea-level waters, especially in far inland and secluded waters. For the above reason the main reliance in this study, especially when covering large territory in limited time, has not been placed on the uncertain open shore phenomena, but on the sure occurrence of deltas built by rivers debouching into the static waters. To avoid doubt or cavil as to glacial (ice-impounded) waters the main dependence has been on the deltas of streams with southward flow, or with flow directed away from the receding ice margin. To determine the true marine plane discrimination must be made between the sand plains which represent the initial sea level and the aggraded, coarse, upstream plains in the one hand, and the finer, submerged, downstream plains on the other hand. Where the valley stream deltas are heavy, with great horizontal extent and large vertical range, making more difficult the location of the primitive water plane, close determination of the latter is made by study of the deposits of small streams and other static-water features along the adjacent valley walls. Of course, the beach phenomena are utilized wherever possible, and especially on exposed coasts. In the extended paper, noted below, will be found a description of field methods, and a discussion of criteria for distinguishing marine features.

The map reveals strikingly the direct relation of the ice sheet to the diastrophic land movement; the area of uplift being the area of glaciation, and the amount of uplift being, apparently, in proportion to the relative thickness of the spreading ice cap. The map also shows the effect of land and sea on the flow and reach of the ice sheet. The ice deployed widely on the land, but was inhibited by the sea; thus producing more rapid flow and steeper gradients along the radii toward the nearer shores.

An independent ice cap over Newfoundland is indicated by the large local uplift.

The map also suggests that the correct name for this latest ice cap is not Labradorian but Quebecan; since the center of uplift, and presumedly the center of snow accumulation, lies between Quebec City and James Bay, while Labrador, proper, is only the narrow border of the so-called "Labrador peninsula."

For the details in this study, in both methods and results; for the description of features in western New England, Maine, St. Lawrence and Ottawa valleys, Gaspé peninsula, New Brunswick, Nova Scotia, Labrador and Newfoundland; and discussion of the possible effects of any change in ocean level, the reader is referred to the detailed paper, published in the *Bulletin* of the Geological Society of America, Vol. 29.

H. L. FAIRCHILD

DEPARTMENT OF GEOLOGY,
UNIVERSITY OF ROCHESTER

THE AMERICAN PHILOSOPHICAL SOCIETY

THE general meeting was held in the hall of the society on Independence Square on April 18, 19 and 20. On the evening of April 19 there was a reception at the hall of the Historical Society of Pennsylvania, when Lieutenant Colonel Robert Andrews Millikan, Ph.D., Sc.D., of the department of science and research of the Council of National Defense spoke on "Science in relation to the war." At the annual dinner given at the University Club on the evening of April 20, the list of toasts was as follows:

"The memory of Franklin": Hon. David Jayne Hill.
"Our learned societies": George Ellery Hale.
"Our universities": Ethelbert D. Warfield.
"The American Philosophical Society": John C. DaCosta.

New members were elected as follows:

Residents in the United States

Henry Andrews Bumstead, A.B., Ph.D., New Haven.
Philip Powell Calvert, Ph.D., Philadelphia.
Clarence Griffin Child, Ph.D., L.H.D., Philadelphia.
William T. Councilman, A.M., M.D., LL.D., Boston.
Victor George Heiser, M.D., New York.
Herbert C. Hoover, B.A., LL.D., Washington.
Aleš Hrdlička, M.D., Washington.
Gilbert Newton Lewis, A.M., Ph.D., Berkeley, Calif.
Theodore Lyman, Ph.D., Cambridge.
J. Percy Moore, Media, Pa.
Louis Valentine Pirsson, M.A., New Haven.
George Harrison Shull, B.S., Ph.D., Princeton.
Joseph Swain, B.L., M.S., LL.D., Swarthmore, Pa.
William Roscoe Thayer, A.M., LL.D., Litt.D., L.H.D., Cambridge
Samuel Wendell Williston, A.M., M.D., Ph.D., Sc.D., Chicago.

Foreign Residents

Joseph Jacques Cesaire Joffre, Paris
Paul Painlevé, Paris.
Raymond Poincaré, Paris.

SCIENTIFIC PROGRAM

Thursday Afternoon, April 18; William B. Scott, D.Sc., LL.D., president, in the chair

Control of prices of food under Queen Elizabeth: E. P. Cheyney, A.M., LL.D., University of Pennsylvania. The five years from 1594 to 1598 were a period of great scarcity and high prices of all food products in England. The average price of wheat, transformed into modern values, was for months at a time above $7 a bushel, and in some places and at certain times, especially in the year 1596, it rose to $15 and even $18 a bushel. Rye, oats and barley were hardly cheaper and meats and other food rose in proportion. There was much privation and disorder. The government took the following steps to overcome the difficulty: (1) One set of provisions was directed toward better distribution of what food was in England. (2) Another set of provisions was directed toward increasing the available supply. (3) It is noticeable that the government did not establish a legal price; no relation was established between the price of grain and the price of flour; no substitutes were provided for. (4) The government, town authorities and the rural gentry were constantly in fear of popular uprisings, and there were several threatening movements which were vigorously punished by the government. (5) No satisfactory method of controlling the supply and price of food was worked out at this time, and the suffering was only alleviated by better crops, heavy taxation for the poor, and the cessation of the war.

Control of commerce in war time: William E. Lingelbach, professor of modern European history, University of Pennsylvania.

The influence of Russian political parties on domestic and international questions: Alexander Petrunkevitch, Ph.D., professor of zoology, Yale University.

The relations of French and American thought in the eighteenth and nineteenth centuries: Albert Schinz, A.M., Ph.D., professor of French literature, Smith College, Northampton, Mass.

Problems of war finance: Thomas S. Adams, Ph.D., professor of political economy, Yale University.

Control of railroads of the United States: Emory R. Johnson, Sc.D., professor of transportation and commerce, University of Pennsylvania.

The sanitation of camps: Colonel Frederick F. Russell, Medical Corps, U. S. A.

Surgical shock: William T. Porter, M.D., LL.D., professor of comparative physiology, Harvard University.

Friday Morning, April 19; J. G. Rosengarten, LL.D., Vice-president, in the Chair

History of the study of Greek vase painting: Stephen B. Luce, curator of Greek antiquities, Museum of the University of Pennsylvania.

The art of George Catlin: Edwin Swift Balch, A.B., of Philadelphia.

Typewriter keyboards; an inquiry for some rational ones: Charles R. Lanman, Ph.D., LL.D., professor of Sanskrit, Harvard University.

Changing of sex ratio in the rat: Helen D. King, associate professor of embryology, Wistar Institute, Philadelphia. This paper gave the results of a series of inbreeding experiments on the albino rat that were made to determine: (1) whether inbreeding increases the number of male offspring, as maintained by Carl Düsing; (2) whether the sex ratio can be altered by selection. The data summarized cover twenty-five generations of inbred rats, comprising 25,452 individuals. Accepting the current view that the spermatozoa are of two kinds, one "male-producing" and the other "female-producing," it is possible to explain the altered sex ratios in the two series by assuming that, in the A series, selection preserved those females for breeding in which the ova had an inherited tendency to attract spermatozoa that were "male-producing"; among the offspring, therefore, there was an excess of males (122.3

males to 100 females). In the B series, on the other hand, selection preserved the females in which the ova tended to attract "female-producing" spermatozoa, consequently the series showed an excess of females (81.8 males to 100 females). The results indicate that it may be possible to swing the sex ratio in a desired direction, even though we are unable to determine the ultimate cause of sex itself.

The Naiades of the upper Tennessee drainage: ARNOLD E. ORTMANN, Ph.D., Sc.D., professor of physical geography, University of Pittsburgh. The upper Tennessee region (above Chattanooga) has long been famous for the great number of mussel species found in its water. It has been studied by various collectors for nearly one hundred years; but up to the present time great confusion prevailed as to the species found in this region, and their affinities. The present writer made it his chief object during four summers, to collect the shells of this drainage together with the former; this is imperative for a proper understanding of all Nayad shells. It was found that the material collected included practically all species previously reported; it was possible to ascertain, in every case, the proper systematic position of each form, and, finally, the geographical distribution of each form, within this area, was ascertained, and was correlated with the geographical range elsewhere. Thus, the present paper represents a complete account, a synopsis, of everything known hitherto about the upper Tennessee mussels and with numerous additional observations not known previously.

A new type of insect larva: WILLIAM MORTON WHEELER, Ph.D., Sc.D., professor of economic entomology, Bussey Institution, Harvard University. The first larval stage ("trophidium") of two African ants, *Pachysima æthiops* Smith and *P. latifrons* Emery, proves to be unlike the larva of any known Formicid or, in fact, of any known insect, in possessing peculiar exudate organs ("exudatoria") surrounding the mouth. These organs are very primitive adipose glands which evidently furnish a liquid agreeable to the worker ants and are very similar to the exudate organs of ant guests (myrmecophiles) and of termites and their guests (termitophiles). The salivary glands and fatbody have a similar function in other ant larvæ. The relations between ants and their larvæ therefore involve mutualistic or reciprocal feeding and this accounts for the development of the colony both ontogenetically and phylogenetically and therefore for the social habit of the Formicidæ. Myrmecophily, trophobiosis, "social parasitism" among the ants themselves and the relations of ants to plants with extrafloral nectaries and food bodies all depend on essentially the same conditions. Similar conclusions are reached in regard to the origin and meaning of the social habit among social wasps, some bees and termites.

A critical survey of the sense of hearing in fishes: GEORGE H. PARKER, Sc.D., professor of zoology, Harvard University. That fishes could hear was maintained by most of the naturalists of antiquity, such as Aristotle and Pliny. This was also the opinion of such masters of the art of fishing as Isaac Walton and of such students of fish anatomy as John Hunter. In fact this was the universal view of the function of the ears in fish till 1878 when von Cyon declared that their only function was to keep the fish in equilibrium. This opinion was supported by Kreidl, who in 1895 attempted to show that when fishes did respond to sounds they responded through the organs of touch and not through the ear. Following Kreidl's work appeared a series of researches some of which supported the opinion that fishes did not respond to sounds at all while others tended to show that fishes did respond to sounds and that this response was mediated by the ear as well as by the skin. One of the most sensitive fishes in this respect is the common catfish *Amiurus*. Tests on this fish were carried out by Parker and Van Heusen with the following results. In catfishes in which the ears had been destroyed, the skin was found sensitive to the dropping of water, to water currents, to a slow vibratory movement of the whole body of water, to the impact of a leaden ball on the slate wall of the aquarium, but not to a whistle blown in the air. In catfishes in which the skin had been rendered insensitive, the ear was stimulated by a slow vibratory movement of the whole body of water, by the impact of the leaden ball, and by a whistle blown in the air, but not by the dropping of water nor by currents of water. To test more fully the effects of sounds, catfishes were subjected to the tones from a telephone contained in a tight rubber bag and submerged in the water of the aquarium. When the ears were destroyed, the catfishes responded to vibrations 43 to 172 per second but not to vibrations 344 to 2,752. When the skin was rendered insensitive, they responded to vibrations 43 to 638 but not to vibrations 1,376 to 2,753. Catfishes respond, therefore, to a range of low vibrations less freely through the skin, more freely through the ear. Hence they have unquestionable powers of hearing.

The perfecting principle: L. H. Bailey, LL.D., late professor of horticulture, Cornell University.

Medicinal plants—present and future supplies: Henry Kraemer, Ph.D., head of department of pharmacology, University of Michigan.

Parasitism among the red algæ: William A. Setchell, Ph.D., professor of botany in the University of California. Parasites among the members of the Rhodophyceæ, or Red Algæ, are becoming more and more known. The author has been paying special attention to these parasites for some years. Of some 51 species, old or new, known to be wholly or partially parasitic, 39 are on plants of the same family of Red Algæ, 8 others are on Red Algæ not of the same family but with some on hosts fairly nearly related; while only 4 are parasitic on hosts belonging to other groups (brown or green algæ). These facts seem significant as to the origin of these parasites. The epiphytic red algæ often penetrate the host plant which is commonly also one of the Red Algæ, but also may be either brown or green. Some light may be thrown on the origin of red parasites, particularly of those parasitic on close relatives by the behavior of the tetrasporangia of *Agardhiella tenera*. As described by Osterhout in 1896 the zonate tetrasporangia germinate as a whole even after division into tetraspores, and produce dwarf unbranched plantlets which penetrate the tissues of the parent plant by basally produced rhizoids. The plantlets produced are largely antheridial, but some are cystocarpic and some even tetrasporic. Such mutations as these plantlets of *Agardhiella* seem to represent, accompanied by a greater or less degree of chlorosis, go far toward indicating a possible origin of these parasites on closely related hosts.

Friday Afternoon, April 19; Albert A. Michelson, Ph.D., Sc.D., LL.D., F.R.S., Vice-president, in the Chair

The genus Galera in North America, with preliminary notes of some new species of Agarics: George F. Atkinson, Ph.D., professor of botany, Cornell University. *Galerula* is a genus of yellow-spored Agaricaceæ including small plants or those of medium size, but slender in form, and fragile. The species have no claim to rank or economic importance, while their ecological rôle as saprophytes is not large owing to the comparatively small number of individuals. Many species are usually associated with mosses on logs or ground in the woods or swamps. A number of species occur on dung heaps or in recently manured grass lands. The larger number of species are some shade of yellow, or tawny, or ochraceous. In taxonomic works the genus is usually divided into sections according to external characters and ecological relations. By this method the species are not grouped according to their real affinities, and in a few cases forms not closely related are assembled under a single specific name. A high degree of internal structural differentiation has taken place in the evolution of the species. In the present study this vantage point has been employed to group the species into sections more nearly in accord with their true relationships. Between 50 and 60 species are recognized in North America.

Temperature, imbibition and growth: D. T. MacDougal, Ph.D., LL.D., director of the department of botanical research, Carnegie Institution of Washington. The effects of temperature upon swelling of biocolloids consisting of agar, and proteins have been previously described. With these results were given measurements of the swelling of sections of *Opuntia* already in a turgid condition with their imbibition capacity nearly satisfied, and not in a growing condition. Special tests were arranged by which the effect of changes in temperature upon the swelling of sections of growing cell-masses and upon the growth of similar masses should be determined. Elongation by growth of the stems in question was at the rate of 5.2 mm. daily at 16°–18° C. and 11–17 mm. daily at 30°–32° C. The increase amounted to a doubling, more or less, for a rise of 10° C. The swelling in transverse sections of similar material was 4.9 per cent. at 17°–19° C. and 7.5 per cent. at 30°–31° C. in distilled water: and 4.9 per cent. at the lower temperature in acidified potassium nitrate and 9.5 per cent. at the higher temperature. The increase by swelling transversely was therefore slightly less than double with a fair inference that it would have been greater in the axis of elongation or growth. It is to be seen therefore that in the elongation of the vegetative axes of plants, the temperature effect is a very complex one, and that the accelerating effect of rising temperature may be primarily an increase in absorption capacity by altered metabolism including lessened accumulations of acids.

Variation in blueberry hybrids: Frederick V. Coville, curator of the U. S. National Herbarium, Department of Agriculture, Washington, D. C.

Organization, reproduction and heredity in Pediastrum: Robert A. Harper, Ph.D., professor of botany, Columbia University.

The potentials of certain magnetized bodies (illustrated by lantern slides): LOUIS A. BAUER, Ph.D., D.Sc., director of the department of terrestrial magnetism, Carnegie Institution of Washington. The author has had occasion in connection with various problems to establish, in a convenient form, the mathematical expressions for the potentials and field-components of certain magnetized bodies of revolution, such as, for example, ellipsoids of revolution and elliptic homeoids. The expressions usually found in treatises either stop at those for the problem of gravitation, or apply only to special cases, or they are not given in the most elegant or convenient form possible for mapping out readily the magnetic field surrounding the bodies. Not infrequently, moreover, the published expressions are found to contain errors of one kind or another.

Development of magnetic susceptibility in manganese steel by prolonged heat treatment: CHARLES FRANCIS BRUSH, Ph.D., ScD., LL.D., of Cleveland.

Accelerometers: N. W. AKIMOFF, of Philadelphia.

Luminescence of radium salts: D. H. KABAKJIAN, assistant professor of physics, University of Pennsylvania, and E. KARRER, of Philadelphia. All radium salts luminesce in the dark at ordinary room temperature. It has been found that when a radium compound is heated to a critical temperature it will almost completely lose its luminosity while at this temperature, but when it is again cooled to room temperature it will acquire a luminosity which is many times (from ten to fifty times for radium bromide, barium bromide) its original luminosity. This property of radium compounds has been investigated as regards the following points: (1) Relation between luminosity and the maximum and minimum temperatures to which the salts have been exposed; (2) decay of the acquired luminosity with time; (3) degree of recovery of luminosity after decay by reheating; (4) relation between luminosity and chemical composition of the salt. The phenomena described in the paper can probably be explained if it be assumed that with the greater molecular freedom imparted to the salt at the higher temperatures certain groupings of molecules are formed which are stable at the higher temperatures but unstable at the ordinary room temperatures. The breaking down of these groups by the action of alpha, beta, gamma rays produces the luminescence. These groupings would correspond to the so-called "active centers" which are postulated by Rutherford in his discussion of luminescence of zinc sulphide, but differ essentially from them by the fact that these can be destroyed and reformed over and over again by heating the compound, whereas the active centers in zinc sulphide, once destroyed, can not be recovered by any simple process.

Saturday Morning, April 20; George Ellery Hale, Ph.D., Sc.D., LL.D., F.R.S., Vice-president, in the Chair

Motions in the stellar systems Struve 1836 and Struve 208: ERIC DOOLITTLE, professor of astronomy, University of Pennsylvania. Any double star in our catalogues may be a system of two suns, which are revolving about one another under the action of their gravitation, or their apparent connection may be only an accidental; one star may be immeasurably farther away than the other and they may only appear to be near together because they are in the same direction from us. In the latter case, measures will in time show that the one sun is drifting past the other in a straight line; in the former, the one will move about the other in an elliptic orbit. The two cases examined present especial difficulty because in each case the companion is moving directly toward the principal star in a straight line. Originally the stars were widely separated; now they are close together and are only visible as a double star in the largest telescopes. The path may be an ellipse, in which case we view it almost edgewise, and if this is the case the motion of the companion will be apparently reversed as it passes about its orbit and the motion will soon become very rapid. Observations of such systems should be secured now, while the companion is at a critical part of its path. It was found that each of the two systems examined were true physical systems and that the motion was in each case orbital.

The number of the spiral nebulæ: H. D. CURTIS, astronomer, Lick Observatory, Mt. Hamilton, Calif.

Soldiers' and sailors' insurance: SAMUEL MCCUNE LINDSAY, Ph.D., LL.D., professor of social legislation, Columbia University, New York.

Italy in the Triple Alliance: WILLIAM ROSCOE THAYER, Litt.D., L.H.D., LL.D., Cambridge, Mass.

Ballistic experiments by a new (?) method: ARTHUR GORDON WEBSTER, Sc.D., LL.D., professor of physics, Clark University, Worcester, and MILDRED ALLEN.

Some considerations on the ballistics of a gun of seventy-five miles' range: ARTHUR GORDON WEBSTER, Sc.D., LL.D., professor of physics, Clark University, Worcester.

The relation of deposits of iron and coal to the great war: William H. Hobbs, Ph.D., Sc.D., professor of geology, University of Michigan.

The peculiar geographical features of northeastern France and their bearing on the war: William Morris Davis, Sc.D., Ph.D., professor emeritus of geology, Harvard University. The strata of the so-called Paris basin lie nested in one another, like a series of broad and shallow platters, the largest one beneath, the smallest one above, but the edges of all of them reaching to about the same altitude, except that the less resistant layers have been worn down somewhat lower than the more resistant ones. As a result, the more resistant layers rise in upland belts of moderate altitude above the intermediate depressions, and both the uplands and the depressions are arranged in concentric arcs around Paris as a center. Eight of these upland belts may be counted in northeastern France, where they dominate the topography. The arrangement of the rivers with respect to the uplands is varied and peculiar. The local features between Verdun on the Meuse and Lunéville on the Meurthe are best understood when described in terms of the upland belts, the depressions and the river valleys.

Rig-veda repetitions: Maurice Bloomfield, Ph.D., LL.D., professor of Sanskrit and comparative philology, Johns Hopkins University.

The Babylonian origin of the Jewish method of slaughter: Paul Haupt, Ph.D., LL.D., professor of Semitic languages, Johns Hopkins University.

Saturday Afternoon, April 20; William B. Scott, D.Sc., LL.D., president, in the Chair

Symposium on food problems in relation to war:

Introductory remarks: Alonzo E. Taylor, M.D., professor of physiological chemistry, University of Pennsylvania.

Physiological effects of prolonged reduced diet on twenty-five men: Francis G. Benedict, Ph.D., Sc.D., director of the nutrition laboratory of the Carnegie Institution of Washington. The possibility of facing stringent food shortage made it desirable to study with the greatest accuracy the physiological effects of a prolonged reduced ration upon a group of healthy young men. Twenty-five men in two squads, volunteers from the International Y. M. C. A. College in Springfield, Massachusetts, were placed upon a reduced ration, approximately one half the number of calories, and at the end of about two months had lost 10 per cent. of their body weight. From there on the calories were adjusted to hold the weight at a constant level. A long series of measurements of the basal metabolism, the neuro-muscular processes, strength tests, etc., as well as a careful clinical examination, were repeated from day to day. The men showed remarkable stamina in the face of the reduced ration, carried out all of their activities, academic and physical, in connection with their college life, and, aside from obvious degree of emaciation, presented no unusual picture. A marked reduction in calories in the intake was effected.

Food conservation from the standpoint of the chemistry of nutrition: Henry C. Sherman, Ph.D., professor of food chemistry, Columbia University, New York City.

Some economic aspects of the American food supply: J. Russell Smith, Ph.D., professor of industry, Wharton School of Finance and Commerce, University of Pennsylvania. One of the first acts of the government with regard to the bread supply was to interfere with the law of supply and demand by guaranteeing increased home consumption and reduced home production. Despite innumerable reports that maximum price fixing had been unsatisfactory in Europe, we tried it. As one of the first big steps in the United States we reduced the maximum price of wheat at a time when more wheat was needed. We also fixed a minimum price for the 1918 crop lower by a dollar than the price prevailing in the spring of 1917. The American farmer quietly but effectively made his answer. The government, through the Department of Agriculture, called for planting of 47,337,000 acres of winter wheat, and it got 11 per cent. less than this, or 42,170,000, almost exactly the amount sown in 1914. Probably the worst part of this wheat price fixing is that it resulted in a destructive price ration. The high prices of meat pushed the price of corn to such a figure that in many parts of the country it was cheaper to feed the pigs on wheat and rye than on corn, and you may depend upon it many of these four-footed brethren got the breadstuff. In some parts of New York state wheat was 40 to 50 cents a bushel higher than corn. The production of such a condition by legislation as our Congress brought about is not to be called food conservation. It is food destruction. As an outraged citizen I protest against legislation that makes me eat corn and makes the pig eat wheat. If I were a pro-German I would secretly applaud it.

Food control and food conservation in the United States army: John R. Murlin, Major, Sanitary Corps, N. A.

Arthur W. Goodspeed,
Secretary